START

Superfund Technical Assessment and Response Team - Region VIII

456070

United States Environmental Protection Agency

Contract No. 68-W5-0031

SAMPLING ACTIVITIES/TRIP REPORT

COUNTY LINE MERCURY
Highlands Ranch, Douglas County, Colorado

TDD No. 9605-0006

OCTOBER 15, 1996

URS
OPERATING SERVICES, INC.

URS OPERATING SERVICES

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October 15, 1996

Mr. Pete Stevenson
On-Scene Coordinator
U.S. Environmental Protection Agency
Region VIII, Mail Code: 8EPR-ER
999 18th Street, Suite 500
Denver, Colorado 80202

SUBJECT: START, EPA Region VIII, Contract No. 68-W5-0031, TDD No. 9605-0006 Sampling Activities/Trip Report, County Line Mercury, Highlands Ranch, Douglas County, Colorado

Dear Mr. Stevenson:

Attached is a final copy of the Sampling Activities/Trip Report for the County Line Mercury site in Highlands Ranch, Douglas County, Colorado. This document is submitted for your approval.

If you have any questions, please call me at 291-8247.

Very truly yours,

URS OPERATING SERVICES, INC.

Jennifer Blair Cockrum
Industrial Hygienist

cc: T. F. Staible/UOS w/o attachments
File/UOS

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SAMPLING ACTIVITIES/TRIP REPORT

COUNTY LINE MERCURY
Highlands Ranch, Douglas County, Colorado

EPA Contract No. 68-W5-0031
TDD No. 9605-0006

Prepared By:
Jennifer Blair Cockrum
Industrial Hygienist

URS Operating Services, Inc.
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Approved: T F Staible
T. F. Staible, START Team Leader, UOS
Date: 15 Oct 96

Approved: Jennifer Blair Cockrum
Jennifer Blair Cockrum, Industrial Hygienist, UOS
Date: 10/15/96

Approved:
Pete Stevenson, OSC, EPA, Region VIII
Date: 10/16/96

SAMPLING ACTIVITIES/TRIP REPORT

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Highlands Ranch, Douglas County, Colorado

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T. F. Staible, START Team Leader, UOS

Approved: _____ Date: 10/15/96
Jennifer Blair Cockrum, Industrial Hygienist, UOS

Approved: _____ Date: _____
Pete Stevenson, OSC, EPA, Region VIII

DISTRIBUTION LIST

U.S. ENVIRONMENTAL PROTECTION AGENCY

Pete Stevenson (4)	On-Scene Coordinator, EPA Region VIII

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File (2 copies)	START, EPA Region VIII

SAMPLING ACTIVITIES/TRIP REPORT
County Line Mercury
Highlands Ranch, Douglas County, Colorado

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1.0 INTRODUCTION

On May 5, 1996, the URS Operating Services, Inc. (UOS) Superfund Technical Assessment and Response Team (START) personnel were mobilized to a residential mercury spill. Pete Stevenson was designated as the U.S. Environmental Protection Agency (EPA) On-Scene Coordinator (OSC). The County Line Mercury site is located on County Line Road at The Bluffs Complex, immediately west of South Broadway, Douglas County, Colorado (Photo 1) (Figure 1).

The original spill occurred during the week of April 28, 1996, when two adolescent males discovered approximately seven unlabeled vials containing mercury in a storm drain culvert (Photo 10). Approximately 7-9 pounds of elemental mercury was released into a culvert/storm drain, on the stair case leading up to Apartment 203 of Building 19 (Apt. 203), within two private residences (Apt. 203 and Apartment 103 of Building 16 (Apt. 103)), and on various patches of the lawn and sidewalk (Photos 1, 2, and 9).

In response to the release, the two residences, the concrete staircase, and the concrete storm drain were cleaned up by Smith/Riedel (Photos 3 and 4).

UOS START personnel departed the site on May 15, 1996.

2.0 SITE WORK/OBSERVATIONS

2.1 INITIAL SITE ENTRY

UOS START personnel mobilized to the site on May 5, 1996, to provide technical assistance and sample the affected areas. Upon arrival at the site, UOS START personnel were briefed by first responder, James Olsen of the Littleton Fire Department. Interviews were conducted with the affected families of Apartments 203 and 103.

Small beads of mercury were noticed in the storm sewer vault, concrete stairway, and lawn adjacent to the concrete stairs (Photos 2 and 5).. The concrete staircase for Building 19, leading up to Apt. 203, was cleaned (Photo 9). The extent of mercury contamination was severe along the steps within a major crack of one step, in the surrounding grass, and in the woodchips to the

north of the steps (Photo 5). Beads of mercury were noted in the garbage disposal and sink in Apt. 203 (Photo 7).

Apt. 103 appeared to have more significant contamination, as fine mercury beads were visible throughout the carpet. The adolescent's bedroom in Apartment 103 had extensive visual mercury contamination on the desk, chair, dresser, carpeting, and television (Photos 13, 14, and 15). Some small beads of mercury were located in the living room on the floor, coffee table, and couch.

2.2 REAL TIME AIR SAMPLING

A Jerome Mercury Vapor Analyzer Model 431-X was used to screen the indoor air quality and ambient air quality within potentially contaminated areas (Photo 6). Mercury vapor concentrations were detected above the instrument detection limit of 0.0003 mg/m^3; therefore, EPA OSC, Pete Stevenson, requested more definitive air monitoring.

2.3 CONTINUOUS AIR SAMPLING

Air sampling was performed by UOS START personnel, employing Hopcalite sorbent media specific collection tubes and air sampling pumps. Air samples were analyzed under NIOSH method 6009 by Schuller Mountain Technical Center in Littleton, Colorado (Appendix B). Continuous indoor air monitoring was conducted within both apartments prior to and following cleanup activities. Efforts were made to repeat air sampling for confirmation of cleanup one month after Apt. 203 and Apt. 103 were closed up. However, the repeat sampling was not done, as the residents from Apt. 103 declined and the residents from Apt. 203 had ongoing scheduling conflicts. The air sampling data is shown in Table 1. Review of the data indicates that reduction in mercury air concentrations occurred in both apartments following cleanup and removal except in the Apt. 103, Adolescent Bedroom, where no noticeable change was measured (Table 2).

2.4 CONFIRMATION SAMPLING

Five soil samples, three sediment samples, and one wipe sample were collected by UOS START personnel and analyzed by Environmental Science and Engineering, Inc. in Englewood, Colorado, for elemental mercury using EPA SW-846 method 7471 (Tables 3 and 4). Both soil and sediment

sample results (shown in Table 3) indicate a reduction in elemental mercury concentrations following cleanup efforts along the concrete stairs and within the storm sewer vault; CL-SO-01 decreased from 8.836 ppm to 0.985 ppm. The mercury concentration of the sediment samples taken from the west side of the culvert drainage were (CL-SE-01) 14.50 ppm and (CL-SO-13) 3.40 ppm after cleanup; sediment samples collected down gradient and outside of the actual culvert (CL-SE-02 and CL-SE-03) were at or below the laboratory's instrument detection limit of 0.1 ppb (Photos 10, 11, and 12) (Appendix B, Analytical Results).

Review of soil and sediment data (Table 3) indicates cleanup efforts were successful in reducing the mercury concentrations in the storm drain/culvert and next to the Building 19 concrete staircase. None of the soil or sediment samples exceeded the EPA Superfund generic soil screening level (SSL) for mercury; ingestion SSL is 23 ppm and the inhalation volatile SSL is 10 ppm.

A wipe sample was collected on the Building 19 staircase. It confirmed the presence of mercury at that location.

2.5 FIELD QUALITY CONTROL

Soil and sediment samples were collected in accordance with UOS START Technical Standard Operating Procedures (TSOP) 4.16, "Surface and Shallow Depth Soil Sampling" (URS Operating Services, Inc. (UOS) 1995). The wipe sample was collected following UOS START TSOP 4.26, "Chip, Wipe, and Sweep Sampling."

2.6 LABORATORY QUALITY CONTROL

Nine soil samples and one wipe sample collected at the County Line Mercury site from May 6 through May 9, 1996, were submitted for analysis of mercury. The samples were analyzed by Environmental Science & Engineering, Inc. (ESE) of Englewood, Colorado, in accordance with procedures specified in SW-846, Method 7471. Definitive data criteria were used.

The data, submitted as two reports (soil/sediment and wipes), were validated by the UOS Quality Assurance Officer. The calibration standards, laboratory control standards and blanks were within

method control limits for the soil/sediment samples; however, all four spike recoveries were outside the 80% to 120% recovery acceptance limits. That was most likely due to the nature of the elemental mercury, which does not distribute evenly throughout soil or sediment. All reported soil/sediment mercury concentrations are estimated due to these physical constraints.

EPA SW-846 method 7471 was modified by the laboratory to analyze the wipe sample. Mercury was detected (Table 3). The data for the wipe sample are acceptable as reported. Data packages for the analytical work are included in Appendix B.

Nine air samples collected from May 9 through May 15, 1996, were submitted to Schuller Mountain Technical Center of Littleton, Colorado, in accordance with NIOSH, Method 6009. Air sampling data was reviewed and was determined to be acceptable as reported.

3.0 SUMMARY

A mercury release occurred on May 5, 1996, when two adolescent males discovered approximately seven unlabeled vials of mercury in a culvert, at The Bluffs Complex near the Douglas/Arapahoe County line in Highlands Ranch, Colorado. UOS START personnel were dispatched and provided technical assistance to OSC, Pete Stevenson.

Mercury contamination was found in two apartments, on site grounds, and in and around a sewer drain/culvert and was documented in photos and sampling. The contaminated areas were cleaned and contaminated material was removed. Sampling was performed to confirm cleanup.

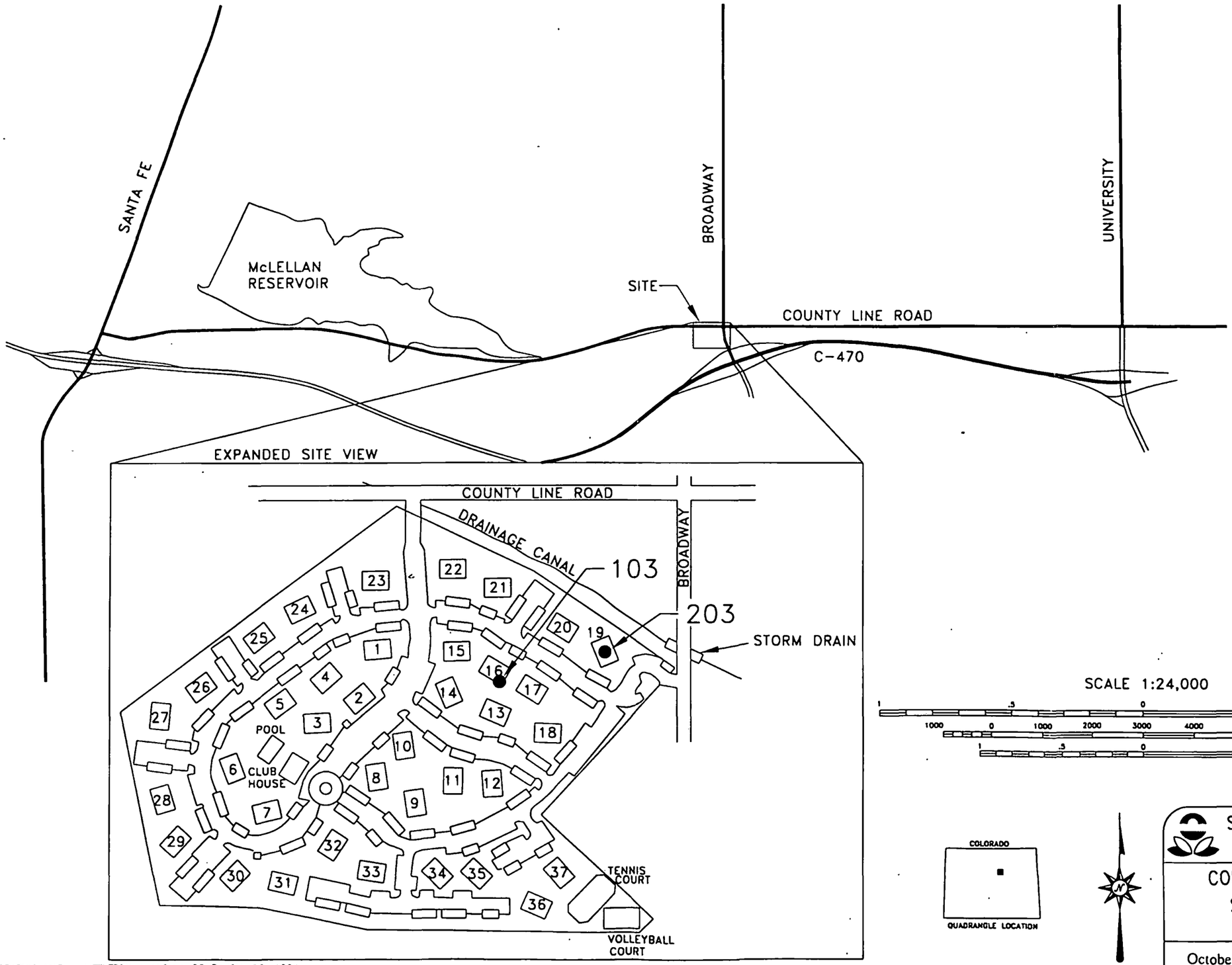
4.0 REFERENCES

American Conference of Governmental Industrial Hygienists (ACGIH). 1995-1996. Threshold Limit Value (TLV) for Chemical Substances and Physical Agents and Biological Exposure Indices (BELs). 6th edition. American Conference of Governmental Industrial Hygienists, Cincinnati, Ohio, 1995.

U.S. Geological Survey (USGS). 1994. 1:24,000 Topographic Map - Littleton and Highlands Ranch, Colorado.

U.S. Environmental Protection Agency (EPA). 1996. Soil Screening Guidance: Technical Background Document. Office of Solid Waste and Emergency Response, Washington, D.C.

URS Operating Services, Inc. (UOS). 1995. Technical Standard Operating Procedures (TSOPs), December 1995.



SCALE 1:24,000

1 .5 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 .5 0 1 KILOMETER

COLORADO

QUADRANGLE LOCATION

SOURCE: USGS 1:24,000 TOPOGRAPHIC MAP - LITTLETON & HIGHLANDS RANCH, CO. 1994

Sampling Activity Report
UOS Job No. 75-60506.00

COUNTY LINE MERCURY
Site Location Map
Figure 1

October 1996

URS OPERATING SERVICES

R13/DRAWINGS/CNTYLINE

TABLE 1
Air Monitoring Sample Results

Sample Number	Date	Location	Air Volume (liters)	Mercury Air Concentration (mg/m^3)
UOS5696-6A/B	5/9/96	Apt. 103, Hallway	1,034	< 0.0005 ND
UOS5696-7A/B	5/9/96	Apt. 103, Living Room	1,035	0.012
UOS5696-8A/B	5/9/96	Apt. 103, Adult Bedroom	1,063	0.0065
UOS5696-9A/B	5/9/96	Apt. 103, Adolescent Bedroom	1,038	0.0058
UOS5696-11A/B	5/10/96	Apt. 203, Kitchen	1,073	0.0031
UOS5696-12A/B	5/10/96	Apt. 203, Adolescent Bedroom	1,065	< 0.0005 ND
UOS5696-13A/B	5/15/96	Apt. 103, Hallway	890	< 0.0006 ND
UOS5696-14A/B	5/15/96	Apt. 103, Adolescent Bedroom	887	0.0063
UOS5696-15A/B	5/15/96	Apt. 103, Living Room	888	0.0050

Detection Limit = 0.05 µg
ND = At or below the detection limit
ACGIH's Occupational Threshold Limit Value = 0.025 ng/m^3 for an eight-hour period (American Conference of Governmental Industrial Hygienists (ACGIH) 1995-96).

TABLE 2
Soil/Sediment Sample Locations

Media	Sample No.	Sample Locations
Sediment Samples	CL-SE-01	Six point composite sediment sample collected along outfall of culvert where adolescents entered culvert;
	CL-SE-02	Six point composite sediment sample collected at outfall of main drainage channel;
	CL-SE-03	Four point composite sediment sample from drainage ditch, approximately 25 feet west and downgradient from beginning of defined channel;
Soil Samples	CL-SO-01	Soil sample along staircase to Apartment 203, both sides of stairs;
	CL-SO-02	Six point composite soil sample collected along stairway to Apartment 203 after cleanup;
	CL-S0-11	Soil sample collected from storm sewer vault where vials where discovered after cleanup;
	CL-SO-110	Duplicate of soil sample CL-SO-11 after cleanup;
	CL-SO-12	Soil sample collected from main culvert where contaminated vault connects to culvert after cleanup;
	CL-SO-13	Same sample location as CL-SE-01 from culvert outfall where adolescents entered culvert after cleanup;
Wipe Sample	CL-WI-01	Wipe sample collected from top concrete step near crack where majority of mercury had deposited;

TABLE 3
Soil/Sediment Sample Results

Sample Number	Date	Location	Mercury Concentration (ppm)
CL-SE-01	5/6/96	West end of culvert where adolescents entered.	14.50
CL-SE-02	5/6/96	West end of culvert at the outfall of the drainage channel.	0.13 ND
CL-SE-03	5/6/96	25 feet west and downgradient of the drainage channel	0.16 ND
CL-SO-01	5/6/96	Building 19, to Apt. 203, from both sides of steps	8.836
CL-SO-02	5/6/96	Building 19, to Apt. 203, from both sides of steps after cleanup	0.985
CL-SO-11	5/8/96	Storm sewer vault, where vials were discovered, after cleanup	0.409
CL-SO-110	5/8/96	Duplicate of CL-SO-11 after cleanup	0.42
CL-SO-12	5/8/96	Vault connection to culvert, after cleanup	5.70
CL-SO-13	5/9/96	Same location as CL-SE-01, west end of culvert, where adolescents entered after cleanup	3.40

Instrument Detection Limit = 0.1 parts per billion (ppb)
ND = at or below detection limit

TABLE 4
Wipe Sample Results

Sample Number	Date	Location	Mercury Concentration µg/wipe
CL-WI-01	5/6/96	Building 19, top step of concrete stairs near crack.	7.4

Instrument Detection Limit = 0.01 µg

TABLE 5
Mercury Vapor Concentrations Detected with 431-x Jerome Mercury Vapor Analyzer (Concentrations in mg/m^3)

Date	Location	Mercury Vapor
5/5/96	Apt. 203, Bldg. 19, stairway	ND
5/5/96	Apt. 203, Bldg. 19, entrance	ND
5/5/96	Apt. 203, Bldg. 19, kitchen sink/disposal	ND
5/5/96	Apt. 203, Bldg. 19, planter on deck	ND
5/5/96	Apt. 203, Bldg. 19, kitchen sponge	ND
5/5/96	Apt. 203, Bldg. 19, patio	ND
5/5/96	Apt. 203, Bldg. 19, bathroom	ND
5/5/96	Apt. 203, Bldg. 19, children's bedroom balcony	ND
5/5/96	Apt. 203, Bldg. 19, living room	ND
5/5/96	Apt. 203, Bldg. 19, adult bathroom	ND
5/5/96	Apt. 203, Bldg. 19, carpet in children's bedroom	ND
5/6/96	Upon initial opening, manhole to storm sewer vault.	0.008
5/6/96	In storm sewer vault (confined space entry)	0.006
5/6/96	In storm sewer vault (confined space entry)	0.004
5/6/96	In storm sewer vault (confined space entry)	0.004
5/7/96	Left side of drainage by stairway to Apt. 203, Bldg. 19, after cleanup	0.096
5/7/96	Right side of drainage by stairway to Apt. 203, Bldg. 19, after cleanup	0.026
5/7/96	Under metal cover by stairway	0.111
5/7/96	Halfway up first flight of stairs leading to Apt. 203, Bldg. 19, (left side)	0.091
5/7/96	Halfway up first flight of stairs leading to Apt. 203, Bldg. 19, (right side)	0.048
5/7/96	Breathing zone along stairway to Apt. 203, Bldg. 19	ND

ND = at or below instrument detection limit
Instrument detection limit = 0.0003 mg/m^3
Instrument maximum sample limit = 9.999 mg/m^3

TABLE 5
Mercury Vapor Concentrations Detected with 431-x Jerome Mercury Vapor Analyzer (Concentrations in mg/m^3) (continued)

Date	Location	Mercury Vapor
5/7/96	Apt. 203, Bldg. 19, inside crack at top of stairs after cleanup	0.072
5/7/96	Apt. 203, Bldg. 19, underneath metal drain cover along west end of drain near stairway	0.034
5/7/96	Under metal drain cover along east end of drain	0.033
5/7/96	Breathing zone at start of stairway	0.007
5/7/96	Breathing zone at entrance to Apts. 104 and 103, Bldg. 16	0.006
5/7/96	Apt. 203, Bldg. 19, along floor on first step on stairway	0.004
5/7/96	Apt. 203, Bldg. 19, breathing zone at entrance	0.004
5/7/96	Apt. 203, Bldg. 19, welcome mat	0.005
5/7/96	Excavated soil on north side of first step of stairway	0.061
5/7/96	Excavated soil on south side of first step of stairway	0.146
5/7/96	Inside barrier brick on south side of stairs	0.045
5/7/96	Apt. 103, Bldg. 16, breathing zone at entrance	0.005
5/7/96	Apt. 103, Bldg. 16, carpet in entrance	0.004
5/7/96	Apt. 103, Bldg. 16, printer in kitchen	0.006
5/7/96	Apt. 103, Bldg. 16, child's clothing bag (inside bag)	Sample exceeded maximum sample limit of 9.999 mg/m^3
5/7/96	Apt. 103, Bldg. 16, bag of clothes and shoes being ventilated outside for possible non-disposal	0.029
5/7/96	Apt. 103, Bldg. 16, black gym bag	0.111
5/7/96	Apt. 103, Bldg. 16, tan gym bag	0.02
5/7/96	Apt. 103, Bldg. 16, mattress while inside bag	0.000
5/7/96	Apt. 103, Bldg. 16, water from "P" trap in sink	0.323

ND = at or below instrument detection limit
Instrument detection limit = 0.0003 mg/m^3
Instrument maximum sample limit = 9.999 mg/m^3

TABLE 5
Mercury Vapor Concentrations Detected with 431-x Jerome Mercury Vapor Analyzer
(Concentrations in mg/m^3)
(continued)

Date	Location	Mercury Vapor
5/7/96	Apt. 103, Bldg. 16, child's bedroom after being closed up along breathing zone	0.03
5/7/96	Apt. 103, Bldg. 16, along floor after being closed up	0.08
5/7/96	Apt. 103, Bldg. 16, child's bedroom while setting up air sampling pumps	0.05
5/7/96	Apt. 103, Bldg. 16, parent's bedroom while setting up air sampling pumps	≥ 0.05
5/7/96	Apt. 103, Bldg. 16, living room	≥ 0.05
5/8/96	Apt. 203, Bldg. 19, welcome mat at Apt. 203 entrance/adjacent to wood steps	ND
5/8/96	Apt. 203, Bldg. 19, child's toys/dolls	0.035 - 0.046
5/8/96	Apt. 203, Bldg. 19, dog brush	0.035
5/8/96	Apt. 203, Bldg. 19, bedding	0.013
5/8/96	Apt. 203, Bldg. 19, pillow	0.014
5/8/96	Apt. 203, Bldg. 19, bedspread	0.004 - 0.006
5/8/96	Apt. 203, Bldg. 19, small pink quilt	0.009
5/8/96	Apt. 103, Bldg. 16, living room	0.092
5/8/96	Apt. 103, Bldg. 16, parents' bedroom	0.080
5/8/96	Apt. 103, Bldg. 16, kids' room	0.042
5/8/96	Apt. 103, Bldg. 16, bathtub drain	0.058
5/8/96	Apt. 103, Bldg. 16, sink drain	0.08
5/8/96	Apt. 103, Bldg. 16, kids' room (repeat)	0.06
5/8/96	Apt. 103, Bldg. 16, living room	0.085
5/8/96	Apt. 103, Bldg. 16, hallway	0.081
5/9/96	Apt. 203, Bldg. 19, adult bedroom	ND
5/9/96	Apt. 203, Bldg. 19, children's bedroom	ND

ND = at or below instrument detection limit
Instrument detection limit = 0.0003 mg/m^3
Instrument maximum sample limit = 9.999 mg/m^3

TABLE 5
Mercury Vapor Concentrations Detected with 431-x Jerome Mercury Vapor Analyzer (Concentrations in mg/m^3) (continued)

Date	Location	Mercury Vapor
5/9/96	Apt. 203, Bldg. 19, kitchen	ND
5/9/96	Apt. 203, Bldg. 19, disposal drain	ND
5/9/96	Apt. 203, Bldg. 19, bedroom drain	ND
5/13/96	Apt. 103, Bldg. 16, entrance	0.006
5/13/96	Apt. 103, Bldg. 16, living room couch	0.011
5/13/96	Apt. 103, Bldg. 16, child's room	0.014
5/13/96	Apt. 103, Bldg. 16, parents' bedroom	0.009
5/13/96	Apt. 103, Bldg. 16, couch in bag after sitting outside	0.204
5/13/96	Apt. 103, Bldg. 16, couch in bag after sitting outside	0.148
5/13/96	Apt. 103, Bldg. 16, vacuum cleaner	"exceeded maximum sample limit of 9.999 mg/m^3"

ND = at or below instrument detection limit
Instrument detection limit = 0.0003 mg/m^3
Instrument maximum sample limit = 9.999 mg/m^3

APPENDIX A

Photolog

PHOTO 1
Storm sewer drain leading into storm sewer vault, looking east. The area is roped off due to mercury contamination.

PHOTO 2
Close up of storm sewer drain with mercury beads present. Drain is located on the east side of the entrance into Bluffs Complex.

PHOTO 3
Smith/Riedel contractors cleaning up free mercury beads with a vacuum along the storm sewer drain.

PHOTO 4
Smith/Riedel personnel performing a confined space entry into the storm sewer vault for cleanup of mercury contamination.

PHOTO 5
START personnel conducting preliminary air monitoring along woodchips near apartment No. 203 with a Jerome Mercury Vapor Analyzer.

PHOTO 6
START personnel surveying mercury contamination along concrete steps leading to Apt. 203, Building 19, with Jerome Mercury Vapor Analyzer.

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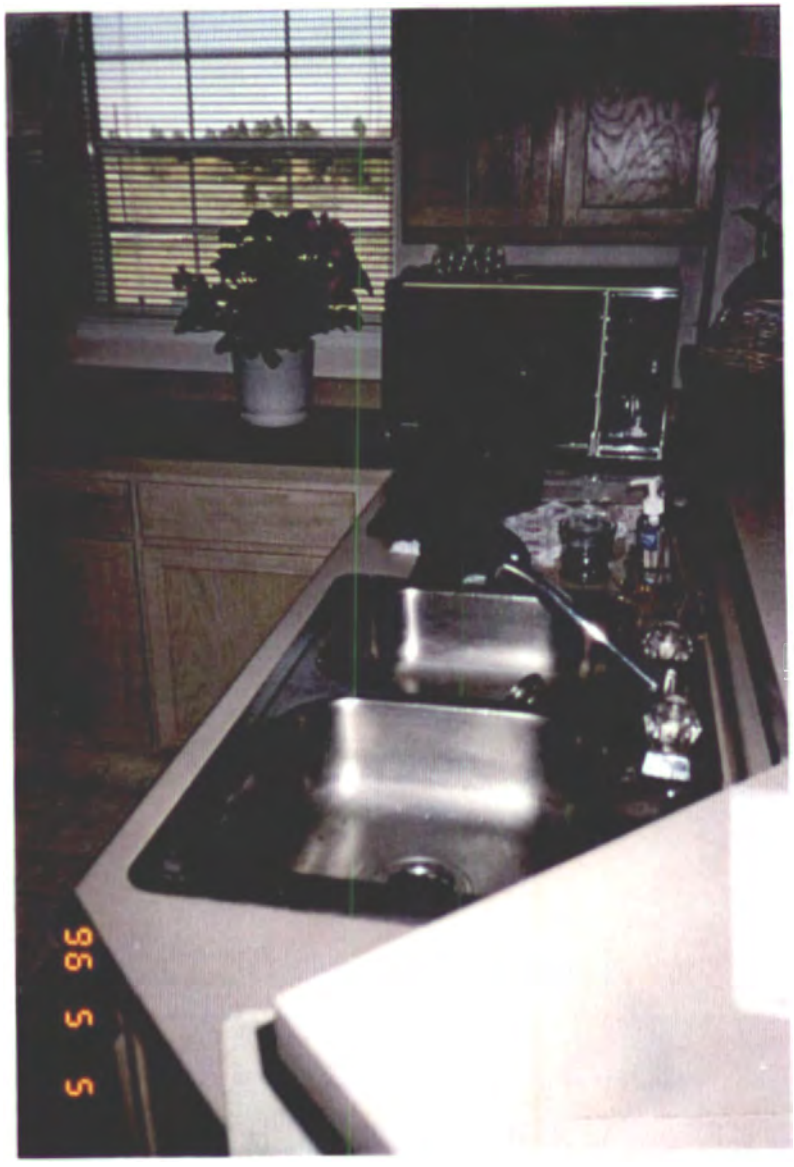

PHOTO 7
Kitchen in Apartment 203. Free standing mercury observed in sink, garbage disposal, and trap.

PHOTO 8
Kitchen of Apartment 203, Building 19.
Note: Apartment had been cleaned prior to survey.

PHOTO 9

Concrete steps leading to Apt. 203 after mercury had been vacuumed. Major crack on top step contained most of the mercury. Woodchips/landscaping had extensive mercury contamination as well. Not all the mercury could be removed.

PHOTO 10

West end of culvert opening. Sample location CL-SE-01 inside edge of culvert. This is where adolescent males entered culvert which connects to vault (left side).

PHOTO 11
Sample location CL-SE-02; drainage channel from west end of culvert.

PHOTO 12
Sample location CL-SE-03; drainage ditch from west end of culvert.

PHOTO 13
Apt. 103, bedroom of one of the adolescents
who discovered and played with the mercury.

PHOTO 14
Apartment 103, bedroom of adolescent.
Extensive mercury contamination on carpeting,
desk, desk chair, bed, and clothing.

PHOTO 15
Bedroom of adolescent in Apt. 103. Mercury beads were found in some of the drawers in the dresser.

PHOTO 16
START personnel monitoring mercury vapor concentrations after belongings had been aired out in front of Apartment No. 103.

PHOTO 17
Furniture and personal belongings of Apt. 103 being aired out on the lawn.

PHOTO 18
Residents' possessions being aired outside in front of Apt. 103.

PHOTO 19
Apartment 103 bedroom of adolescent being aired out after carpet removal.

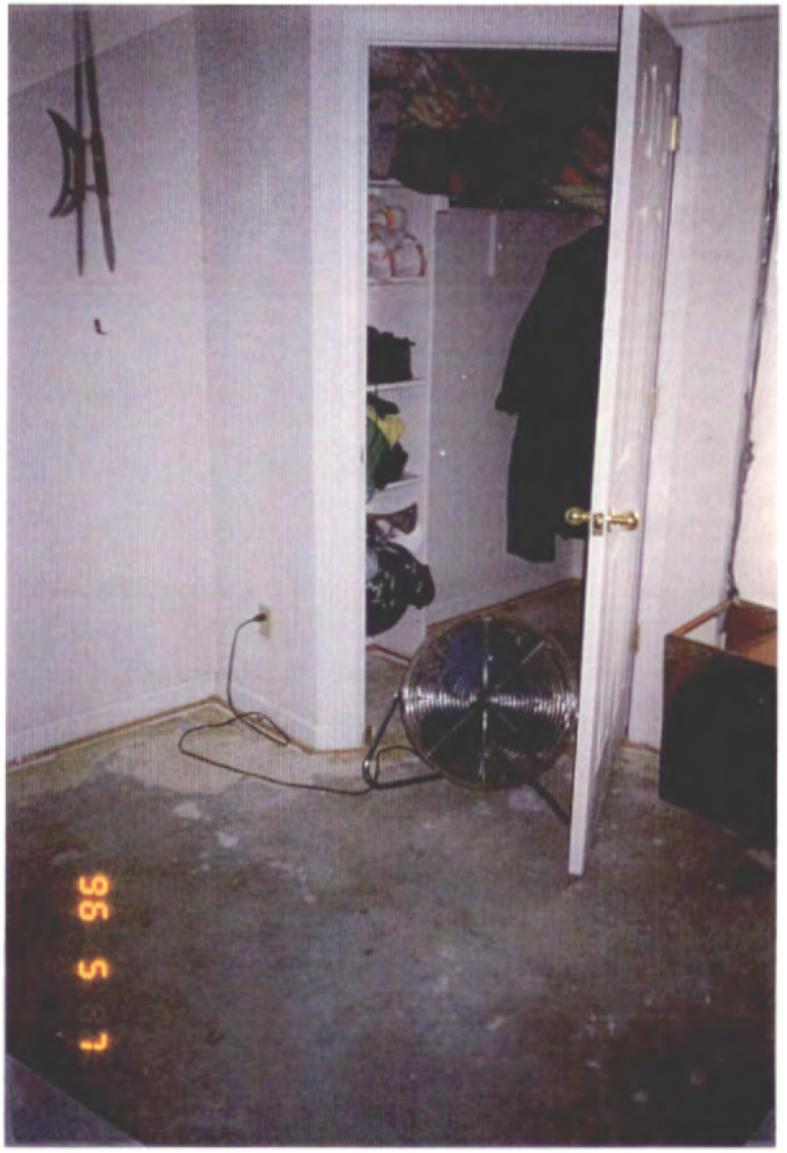

PHOTO 20
Apartment 103, adolescent's bedroom closet being ventilated.

PHOTO 21
Bagged items from Apartment 103 for disposal after ventilation efforts were unsuccessful in lowering mercury vapor concentrations.

PHOTO 22
Vacuum cleaner to be disposed of. Mercury vapor concentrations were too high for residents to keep.

APPENDIX B

Analytical Results

INORGANIC DATA QUALITY ASSURANCE REVIEW

REVIEW NARRATIVE SUMMARY

This data package was reviewed according to the EPA document "Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analysis," July 1, 1988 revision.

The data package, Case ---, SDG D17445 consisted of three sediment and six soil samples for mercury analyses.

The following table lists the data qualifiers added to the sample analyses. Please see Data Qualifier Definitions, attached to the end of this report.

Sample ID	Elements	Qualifiers	Reason for Qualification	Review Section
SE-1	Hg	J	Spike Recovery	IX
SE-2	Hg	UJ	Spike Recovery	IX
SE-3	Hg	UJ	Spike Recovery	IX
SO-1	Hg	J	Spike Recovery	IX
SO-2	Hg	J	Spike Recovery	IX
SO-11	Hg	J	Spike Recovery	IX
SO-12	Hg	J	Spike Recovery	IX
SO-13	Hg	J	Spike Recovery	IX
SO-110	Hg	J	Spike Recovery	IX

REGION VIII
SUMMARY OF DATA QUALITY ASSURANCE REVIEW
INORGANIC

Case/TDD NO.	Site Name		Operable Unit
9605-0006	County Line Mercury		
RPM/OSC Name			
Pete Stevenson			
Contractor Laboratory	**Contract No.**	**SDG No.**	**Laboratory TPO/Region**
Environmental Science and Engineering, Inc.		D17445	

Review Assigned Date: July 1996 Data Validator: Lori Raschke
Review Completion Date: August 20, 1996 Report Reviewer: Kent Alexander

Sample ID	Sample Location	Matrix
SE-1	SE-1	Sediment
SE-2	SE-2	Sediment
SE-3	SE-3	Sediment
SO-1	SO-1	Soil
SO-2	SO-2	Soil
SO-11	SO-11	Soil
SO-12	SO-12	Soil
SO-13	SO-13	Soil
SO-110	SO-110	Soil

DATA QUALITY STATEMENT

( ) Data are ACCEPTABLE according to EPA Functional guidelines with no qualifiers (flags) added by the reviewer.
( ) Data are UNACCEPTABLE according to EPA Functional Guidelines.
(✓) Data are acceptable with QUALIFICATIONS noted in review.

Telephone/Communication Logs Enclosed? Yes ✓ No _____

TPO Attention Required? Yes _____ No ✓ If yes, list the items that require attention:

_____

_____

Method Number SW-846 Method 7471
Revision -

Inorganic Deliverables Completeness Checklist

P Inorganic Cover Page
P Inorganic Analysis Data Sheets (Form I)
P Initial Calibration and Calibration Verification Results (Form II)
P Continuing Calibration Verification Results (Form II)
NA CRDL Standard for ICP and AA (Form II, Part 2)
P Blank Analysis Results (Form III)
NA ICP Interference Check Sample Results (Form IV)
P Spiked Sample Results (Form V)
NA Post-digest Spiked Sample Analysis (Form V, Part 2)
NP Duplicate Sample Results (Form VI)
P Instrument Detection Limits (Form VII) or (Form X - Quarterly)
P Laboratory Control Sample results (Form VII)
NA Standard Addition Results (Form VIII)
NA ICP Serial Dilution Results (Form IX)
NA ICP Interelement Correction Factors (Form XII - Quarterly _, or Form XI - Annually)
NA ICP Linear Ranges (Form XII - Quarterly)
P Raw Data

P Samples	P Calibration Standards	P Blanks	P Spikes
NP Duplicates	NA ICP QC (ICS and Serial Dilution	P LCS	
NA Furnace AA	P Mercury Analysis	NA Cyanide Analysis	

P Percent Solids Calculations - Solids Only
P Sample Prep/Digestion Logs (Form XIII)
P Analysis Run Log (Form XIV)
P Chain-of-Custody
P Sample Description
P Case Narrative
P Method References

KEY:
P = Provided in original data package, as required
R = Provided as resubmission
NP = Not provided in original data package or as resubmission
NR = Not required
NA = Not applicable to this data package or analysis

Comments:

I. DELIVERABLES

All required Deliverables were present.

Yes ✓ No ___

Comments: None

II. HOLDING TIMES

All CLP holding times were met.

Yes ___ No ___ N/A ✓

Comments: None

All 40 CFR Part 136 technical holding times were met.

Yes ✓ No ___

Comments: 28-day holding time was met.

III. INSTRUMENT CALIBRATIONS: STANDARDS AND BLANKS

Initial instrument calibrations were performed according to requirements.

Yes ✓ No ___

Comments: The initial calibration correlation coefficients were greater than 0.995.

The instruments were calibrated daily and each time an analysis run was performed.

Yes ✓ No ___

Comments: Samples were analyzed on two days. A full initial calibration was run each day.

The instruments were calibrated using one blank and the appropriate number of standards.

Yes ✓ No ___

Comments: A blank and five initial calibration standards were analyzed.

IV. FORM 1 - SAMPLE ANALYSIS RESULTS

Sample analyses were entered correctly on Form Is.

Yes ✓ No ___

Comments: None

V. FORM 2A - INITIAL AND CONTINUING CALIBRATION VERIFICATION

The initial and continuing calibration verification standards (ICV and CCV, respectively) met requirements.

Yes ✓ No ___

Comments: An ICV was analyzed immediately after each initial calibration.

The calibration verification results were within 80-120% for recovery.

Yes ✓ No ___

Comments: None

The continuing calibration standards were run at 10% frequency.

Yes ✓ No ___

Comments: The CCV was analyzed at a frequency of 10% or every two hours as required.

VI. FORM 2B - CRDL STANDARD FOR ICP AND AA

ICP Analysis: Standards (CRI) at two times the CRDL or the IDL (whichever were greater) were analyzed at the beginning and the end of each sample run, or at a minimum of twice per eight hours, whichever was more frequent.

Yes ___ No ___ N/A ✓

Comments: None

GFAA Analysis: Standards (CRA) at two times CRDL were analyzed at the beginning of each sample run.

Yes ___ No ___ N/A ✓

Comments: None

The CRI and/or the CRA were analyzed after the ICV.

Yes ___ No ✓

Comments: No data are qualified due to the absence of CRI and/or CRA.

VII. FORM 3 - BLANKS

The initial and continuing calibration blanks (ICB and CCB, respectively) met SW846 requirements.

Yes ✓ No ___

Comments: None

The continuing calibration blanks were run at 10% frequency.

Yes ✓ No ___

Comments: None

A laboratory/preparation blank was run at the frequency of one per twenty samples, or per sample delivery group (whichever is more frequent), and for each matrix analyzed.

Yes ✓ No ___

Comments: None

All analyzed blanks were free of contamination.

Yes ✓ No ___

Comments: None

VIII. FORM 4 - ICP INTERFERENCE CHECK SAMPLE

The ICP interference check sample (ICS) was run twice per eight hour shift and/or at the beginning and end of each sample set analysis sequence (whichever is more frequent).

Yes ___ No ___ N/A ✓

Comments: None

Percent recovery of the analytes in solution ICSAB were within the range of 80-120%.

Yes ___ No ___ N/A ✓

Comments: None

IX. FORM 5A - MATRIX SPIKE SAMPLE ANALYSIS

A matrix spike sample was analyzed with every twenty or fewer samples of a similar matrix, or one per sample delivery group (whichever is more frequent).

Yes ✓ No ___

Comments: The spiked samples were analyzed for each matrix (soil, sediment).

The percent recoveries (%R) were calculated correctly.

$$\%\ Recovery = \frac{(SSR - SR)}{SA} X\ 100$$

SSR = spiked sample result
SR = sample result
SA = spike added

Yes ✓ No ___

Comments: None

Spike recoveries were within the range of 75-125% (an exception is granted where the sample concentration is four times the spike concentration.

Yes ___ No ✓

Comments: Sporadic results were observed for matrix spikes. The data narrative states that the laboratory made every effort to homogenize the samples; however, the target analyte, elemental mercury, is not amenable to even distribution throughout soil and sediment samples. The following table lists the spike recoveries outside control limits, matrix, samples affected, and data qualifiers.

Element	Spike Recovery	Matrix	Samples Affected	Qualifiers
Hg	-1,053.7%	Soil	All soil samples	J/UJ
Hg	-1,054.7%	Soil	All soil samples	J/UJ
Hg	565.8%	Sediment	All sediment samples	J
Hg	68.4%	Sediment	All sediment samples	J

X. FORM 5B - POST DIGEST SPIKE RECOVERY

A post-digest spike was performed for those elements that did not meet the specified criteria (i.e., Pre-digestion/pre-distillation spike recovery falls outside of control limits and sample result is less than four times the spike amount added, exception: Ag, Hg).

Yes ___ No ___ Not Required ✓

Comments: None

XI. FORM 6 - DUPLICATE SAMPLE ANALYSIS

Duplicate sample analysis was performed with every twenty or fewer samples of a similar matrix, or one per sample delivery group (whichever is more frequent).

Yes ___ No ✓

Comments: The Chain-of-Custody indicated that a MS/MSD was required. Inorganic analyses normally do not receive MSD analysis; however, the laboratory followed the instructions on the Chain-of-Custody and analyzed a spiked duplicate on each matrix rather than an unspiked duplicate.

The RPDs were calculated correctly.

$$RPD = \frac{(S - D)}{(S + D)/2} \times 100$$

S = sample
D = duplicate

Yes ___ No ___ N/A ✓

Comments: RPDs were not calculated. No additional qualifiers are placed on the data due to omission of duplicate sample analysis.

For sample concentrations greater than five times the CRDL, RPDs were within ±20% (limits of ±35% apply for soil/sediments/tailings samples).

Yes ___ No ___ N/A ✓

Comments: See previous comment, this section.

For sample concentrations less than five times the CRDL, duplicate analysis results were within the control window of ± CRDL (two times CRDL for soils).

Yes ___ No ___ N/A ✓

Comments: See previous comment, this section.

XII. GFAA QC

Not required.

XIII. FORM 7 - LABORATORY CONTROL SAMPLE

The laboratory control sample (LCS) was prepared and analyzed with every twenty or fewer samples of a similar matrix, or one per sample delivery group (whichever is more frequent).

Yes ✓ No ___

Comments: None

All results were within control limits.

Yes ✓ No ___

Comments: The LCS was recovered within control limits, indicating that the laboratory digestion and spiking process was acceptable.

XIV. FORM 8 - STANDARD ADDITION RESULTS

Results from graphite furnace standard additions were entered on Form VIII as directed.

Yes ___ No ___ N/A ✓

Comments: None

XV. FORM 9 - ICP QC

A serial dilution was performed for ICP analysis with every twenty or fewer samples of a similar matrix, or one per sample delivery group, whichever is more frequent.

Yes ___ No ___ N/A ✓

Comments: None

The serial dilution was without interference problems as defined.

Yes ___ No ___ N/A ✓

Comments: None

XVI. FORM 10 - QUARTERLY INSTRUMENT DETECTION LIMITS (IDL)

IDLs were provided for mercury.

Yes ✓ No ___

Comments: None

Reported IDLs met requirements.

Yes ✓ No ___

Comments: None

XVII. FORM 11 - INTERELEMENT CORRECTION FACTORS FOR ICP

Interelement corrections for ICP were reported.

Yes ___ No ___ N/A ✓

Comments: None

XVIII. FORM 12 - ICP LINEAR RANGES

ICP linear ranges were reported.

Yes ___ No ___ N/A ✓

Comments: None

XIX. LINEAR RANGE VERIFICATION ANALYSIS

Linear Range Verification Analysis (LRA) was performed and results were within control limits of ± 5% of the true value.

Yes ✓ No ___

Comments: None

XX. FORM 13 - PREPARATION LOG

Information on the preparation of samples for analysis was reported on Form XIII.

Yes ✓ No ___

Comments: None

XXI. FORM 14 - ANALYSIS RUN LOG

A Form XIV with the required information was filled out for each analysis run in the data package.

Yes ✓ No ___

Comments: None

XXII. Additional Comments or Problems/Resolutions not addressed above.

Spike analyses indicate that the sample matrices and the nature of elemental mercury compromise the accuracy of sample analyses. All data are estimated due to these physical restraints. The acceptability of laboratory performance, in general, is indicated by the acceptability of other laboratory quality control criteria.

INORGANIC DATA QUALITY ASSURANCE REVIEW

Region VIII

DATA QUALIFIER DEFINITIONS

For the purpose of Data Validation, the following code letters and associated definitions are provided for use by the data validator to summarize the data quality. Use of additional qualifiers should be carefully considered. Definitions for all qualifiers used should be provided with each report.

GENERAL QUALIFIERS for use with both INORGANIC and ORGANIC DATA

R - Reported value is "rejected." Resampling or reanalysis may be necessary to verify the presence or absence of the compound.

J - The associated numerical value is an estimated quantity because the Quality Control criteria were not met.

U J - The reported amount is estimated because Quality Control criteria were not met. Element or compound was not detected.

N J - The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.

N - The analysis indicates the presence of an analyte for which there is presumptive evidence to make a tentative identification.

ACRONYMS

AA	Atomic Absorption
Ag	Silver
CCB	Continuing Calibration Blank
CCV	Continuing Calibration Verification
CFR	Code of Federal Regulations
CLP	Contract Laboratory Program
CRA	CRDL standard required for AA
CRDL	Contract Required Detection Limit
CRI	CRDL standard required for ICP
CV	Cold Vapor
EPA	U.S. Environmental Protection Agency
GFAA	Graphite Furnace Atomic Absorption
Hg	Mercury
ICB	Initial Calibration Blank
ICP	Inductively Coupled Plasma
ICS	Interference Check Sample
ICSA	Interference Check Sample (Solution A)
ICSAB	Interference Check Sample (Solution AB)
ICV	Initial Calibration Verification
IDL	Instrument Detection Limit
LCS	Laboratory Control Sample
LRA	Linear Range Verification Analysis
MSA	Method of Standard Additions
PDS	Post Digestion Spike
QC	Quality Control
RPD	Relative Percent Difference
RPM	Regional Project Manager
RSD	Percent Relative Standard Deviation
SA	Spike Added
SAS	Special Analytical Services
SDG	Sample Delivery Group
SR	Sample Result
SSR	Spiked Sample Result
TPO	Technical Project Officer

U.S. EPA - CLP

EPA SAMPLE NO.

1

INORGANIC ANALYSIS DATA SHEET

SE0001

Lab Name: ENVIRON. SCI. & ENGINEER. Contract: 1795122G

Lab Code: ESECO Case No.: SAS No.: SDG No.: D17445

Matrix (soil/water): SOIL Lab Sample ID: 220208*1

Level (low/med): LOW Date Received: 05/09/96

% Solids: 81.4

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum					
7440-36-0	Antimony					
7440-38-2	Arsenic					
7440-39-3	Barium					
7440-41-7	Beryllium					
7440-43-9	Cadmium					
7440-70-2	Calcium					
7440-47-3	Chromium					
7440-48-4	Cobalt					
7440-50-8	Copper					
7439-89-6	Iron					
7439-92-1	Lead					
7439-95-4	Magnesium					
7439-96-5	Manganese					
7439-97-6	Mercury	14.50			CV	J
7440-02-0	Nickel					
7440-09-7	Potassium					
7782-49-2	Selenium					
7440-22-4	Silver					
7440-23-5	Sodium					
7440-28-0	Thallium					
7440-62-2	Vanadium					
7440-66-6	Zinc					
	Cyanide				NR	

LR 5/20/96

Color Before: BROWN Clarity Before: Texture: SOIL

Color After: COLORLESS Clarity After: Artifacts: NO

Comments:

U.S. EPA - CLP

EPA SAMPLE NO.

1

INORGANIC ANALYSIS DATA SHEET

SE0002

Lab Name: ENVIRON. SCI. & ENGINEER. Contract: 1795122G

Lab Code: ESECO Case No.: SAS No.: SDG No.: D17445

Matrix (soil/water): SOIL Lab Sample ID: 220208*2

Level (low/med): LOW Date Received: 05/09/96

% Solids: 78.3

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium				
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron				
7439-92-1	Lead				
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury	0.13	U		CV
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				NR

UJ

CR 8/26/96

Color Before: BROWN Clarity Before: Texture: SOIL

Color After: COLORLESS Clarity After: Artifacts: NO

Comments:

U.S. EPA - CLP

EPA SAMPLE NO.

1

INORGANIC ANALYSIS DATA SHEET

SE0003

Lab Name: ENVIRON. SCI. & ENGINEER. Contract: 1795122G

Lab Code: ESECO Case No.: SAS No.: SDG No.: D17445

Matrix (soil/water): SOIL Lab Sample ID: 220208*3

Level (low/med): LOW Date Received: 05/09/96

% Solids: 64.2

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum					
7440-36-0	Antimony					
7440-38-2	Arsenic					
7440-39-3	Barium					
7440-41-7	Beryllium					
7440-43-9	Cadmium					
7440-70-2	Calcium					
7440-47-3	Chromium					
7440-48-4	Cobalt					
7440-50-8	Copper					
7439-89-6	Iron					
7439-92-1	Lead					
7439-95-4	Magnesium					
7439-96-5	Manganese					
7439-97-6	Mercury	0.16	U		CV	UJ
7440-02-0	Nickel					
7440-09-7	Potassium					
7782-49-2	Selenium					
7440-22-4	Silver					
7440-23-5	Sodium					
7440-28-0	Thallium					
7440-62-2	Vanadium					
7440-66-6	Zinc					
	Cyanide				NR	

JR 9/20/96

Color Before: BROWN Clarity Before: Texture: SOIL

Color After: COLORLESS Clarity After: Artifacts: NO

Comments:

U.S. EPA - CLP

EPA SAMPLE NO.

1

INORGANIC ANALYSIS DATA SHEET

SO0001

Lab Name: ENVIRON. SCI. & ENGINEER. Contract: 1795122G

Lab Code: ESECO Case No.: SAS No.: SDG No.: D17445

Matrix (soil/water): SOIL Lab Sample ID: 220208*4

Level (low/med): LOW Date Received: 05/09/96

% Solids: 83.3

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum					
7440-36-0	Antimony					
7440-38-2	Arsenic					
7440-39-3	Barium					
7440-41-7	Beryllium					
7440-43-9	Cadmium					
7440-70-2	Calcium					
7440-47-3	Chromium					
7440-48-4	Cobalt					
7440-50-8	Copper					
7439-89-6	Iron					
7439-92-1	Lead					
7439-95-4	Magnesium					
7439-96-5	Manganese					
7439-97-6	Mercury	8.836			CV	J
7440-02-0	Nickel					
7440-09-7	Potassium					
7782-49-2	Selenium					
7440-22-4	Silver					
7440-23-5	Sodium					
7440-28-0	Thallium					
7440-62-2	Vanadium					
7440-66-6	Zinc					
	Cyanide				NR	

CR 8/26/96

Color Before: BROWN Clarity Before: Texture: SOIL

Color After: COLORLESS Clarity After: Artifacts: NO

Comments:

U.S. EPA - CLP

EPA SAMPLE NO.

1

INORGANIC ANALYSIS DATA SHEET

SO0002

Lab Name: ENVIRON. SCI. & ENGINEER. Contract: 1795122G

Lab Code: ESECO Case No.: SAS No.: SDG No.: D17445

Matrix (soil/water): SOIL Lab Sample ID: 220208*10

Level (low/med): LOW Date Received: 05/09/96

% Solids: 80.3

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium				
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron				
7439-92-1	Lead				
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury	0.985		N	CV
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				NR

J

UR 8/21/96

Color Before: BROWN Clarity Before: Texture: SOIL

Color After: COLORLESS Clarity After: Artifacts: NO

Comments:

U.S. EPA - CLP

EPA SAMPLE NO.

1

INORGANIC ANALYSIS DATA SHEET

SO0011

Lab Name: ENVIRON. SCI. & ENGINEER. Contract: 1795122G

Lab Code: ESECO Case No.: SAS No.: SDG No.: D17445

Matrix (soil/water): SOIL Lab Sample ID: 220208*6

Level (low/med): LOW Date Received: 05/09/96

% Solids: 76.2

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum					
7440-36-0	Antimony					
7440-38-2	Arsenic					
7440-39-3	Barium					
7440-41-7	Beryllium					
7440-43-9	Cadmium					
7440-70-2	Calcium					
7440-47-3	Chromium					
7440-48-4	Cobalt					
7440-50-8	Copper					
7439-89-6	Iron					
7439-92-1	Lead					
7439-95-4	Magnesium					
7439-96-5	Manganese					
7439-97-6	Mercury	0.409		N	CV	J
7440-02-0	Nickel					
7440-09-7	Potassium					
7782-49-2	Selenium					
7440-22-4	Silver					
7440-23-5	Sodium					
7440-28-0	Thallium					
7440-62-2	Vanadium					
7440-66-6	Zinc					
	Cyanide				NR	

LR 8/26/96

Color Before: BROWN Clarity Before: Texture: SOIL

Color After: COLORLESS Clarity After: Artifacts: NO

Comments:

U.S. EPA - CLP

EPA SAMPLE NO.

1

INORGANIC ANALYSIS DATA SHEET

SO0012

Lab Name: ENVIRON. SCI. & ENGINEER. Contract: 1795122G

Lab Code: ESECO Case No.: SAS No.: SDG No.: D17445

Matrix (soil/water): SOIL Lab Sample ID: 220208*7

Level (low/med): LOW Date Received: 05/09/96

% Solids: 72.7

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum					
7440-36-0	Antimony					
7440-38-2	Arsenic					
7440-39-3	Barium					
7440-41-7	Beryllium					
7440-43-9	Cadmium					
7440-70-2	Calcium					
7440-47-3	Chromium					
7440-48-4	Cobalt					
7440-50-8	Copper					
7439-89-6	Iron					
7439-92-1	Lead					
7439-95-4	Magnesium					
7439-96-5	Manganese					
7439-97-6	Mercury	5.70		N	CV	J
7440-02-0	Nickel					
7440-09-7	Potassium					
7782-49-2	Selenium					
7440-22-4	Silver					
7440-23-5	Sodium					
7440-28-0	Thallium					
7440-62-2	Vanadium					
7440-66-6	Zinc					
	Cyanide				NR	

LR 8/26/96

Color Before: BROWN Clarity Before: Texture: SOIL

Color After: COLORLESS Clarity After: Artifacts: NO

Comments:

U.S. EPA - CLP

EPA SAMPLE NO.

1

INORGANIC ANALYSIS DATA SHEET

SO0013

Lab Name: ENVIRON. SCI. & ENGINEER. Contract: 1795122G

Lab Code: ESECO Case No.: SAS No.: SDG No.: D17445

Matrix (soil/water): SOIL Lab Sample ID: 220208*8

Level (low/med): LOW Date Received: 05/09/96

% Solids: 87.4

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum					
7440-36-0	Antimony					
7440-38-2	Arsenic					
7440-39-3	Barium					
7440-41-7	Beryllium					
7440-43-9	Cadmium					
7440-70-2	Calcium					
7440-47-3	Chromium					
7440-48-4	Cobalt					
7440-50-8	Copper					
7439-89-6	Iron					
7439-92-1	Lead					
7439-95-4	Magnesium					
7439-96-5	Manganese					
7439-97-6	Mercury	3.40		N	CV	J
7440-02-0	Nickel					
7440-09-7	Potassium					
7782-49-2	Selenium					
7440-22-4	Silver					
7440-23-5	Sodium					
7440-28-0	Thallium					
7440-62-2	Vanadium					
7440-66-6	Zinc					
	Cyanide				NR	

JR 8/26/96

Color Before: BROWN Clarity Before: Texture: SOIL

Color After: COLORLESS Clarity After: Artifacts: NO

Comments:

U.S. EPA - CLP

EPA SAMPLE NO.

1

INORGANIC ANALYSIS DATA SHEET

SO0110

Lab Name: ENVIRON. SCI. & ENGINEER. Contract: 1795122G

Lab Code: ESECO Case No.: SAS No.: SDG No.: D17445

Matrix (soil/water): SOIL Lab Sample ID: 220208*9

Level (low/med): LOW Date Received: 05/09/96

% Solids: 75.3

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum					
7440-36-0	Antimony					
7440-38-2	Arsenic					
7440-39-3	Barium					
7440-41-7	Beryllium					
7440-43-9	Cadmium					
7440-70-2	Calcium					
7440-47-3	Chromium					
7440-48-4	Cobalt					
7440-50-8	Copper					
7439-89-6	Iron					
7439-92-1	Lead					
7439-95-4	Magnesium					
7439-96-5	Manganese					
7439-97-6	Mercury	0.42		N	CV	J
7440-02-0	Nickel					
7440-09-7	Potassium					
7782-49-2	Selenium					
7440-22-4	Silver					
7440-23-5	Sodium					
7440-28-0	Thallium					
7440-62-2	Vanadium					
7440-66-6	Zinc					
	Cyanide				NR	

LR 8/26/96

Color Before: BROWN Clarity Before: Texture: SOIL

Color After: COLORLESS Clarity After: Artifacts: NO

Comments:

REGION VIII
SUMMARY OF DATA QUALITY ASSURANCE REVIEW
INORGANIC

Case/TDD NO.	Site Name		Operable Unit
9605-0006	County Line Mercury		
RPM/OSC Name			
Pete Stevenson			
Contractor Laboratory	**Contract No.**	**SDG No.**	**Laboratory TPO/Region**
Environmental Science and Engineering, Inc.		D17560	

Review Assigned Date: July 1996 Data Validator: Lori Raschke
Review Completion Date: August 20, 1996 Report Reviewer: Kent Alexander

Sample ID	Sample Location	Matrix
WI-0001	WI-0001	Wipe

DATA QUALITY STATEMENT

(✓) Data are ACCEPTABLE according to EPA Functional guidelines with no qualifiers (flags) added by the reviewer.
( ) Data are UNACCEPTABLE according to EPA Functional Guidelines.
( ) Data are acceptable with QUALIFICATIONS noted in review.

Telephone/Communication Logs Enclosed? Yes ✓ No _____

TPO Attention Required? Yes _____ No ✓ If yes, list the items that require attention:

_____

_____

INORGANIC DATA QUALITY ASSURANCE REVIEW

REVIEW NARRATIVE SUMMARY

This data package was reviewed according to the EPA document "Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analysis," July 1, 1988 revision.

The data package, Case ____---____, SDG _D17445___ consisted of one wipe sample for mercury analysis.

The following table lists the data qualifiers added to the sample analyses. Please see Data Qualifier Definitions, attached to the end of this report.

Sample ID	Elements	Qualifiers	Reason for Qualification	Review Section

Method Number SW-846 Method 7471
Revision ____ - ____

Inorganic Deliverables Completeness Checklist

- P Inorganic Cover Page
- P Inorganic Analysis Data Sheets (Form I)
- P Initial Calibration and Calibration Verification Results (Form II)
- P Continuing Calibration Verification Results (Form II)
- NA CRDL Standard for ICP and AA (Form II, Part 2)
- P Blank Analysis Results (Form III)
- NA ICP Interference Check Sample Results (Form IV)
- NA Spiked Sample Results (Form V)
- NA Post-digest Spiked Sample Analysis (Form V, Part 2)
- NA Duplicate Sample Results (Form VI)
- P Instrument Detection Limits (Form VII) or (Form X - Quarterly)
- P Laboratory Control Sample results (Form VII)
- NA Standard Addition Results (Form VIII)
- NA ICP Serial Dilution Results (Form IX)
- NA ICP Interelement Correction Factors (Form XII - Quarterly _, or Form XI - Annually)
- NA ICP Linear Ranges (Form XII - Quarterly)
- P Raw Data
  - P Samples P Calibration Standards P Blanks NA Spikes
  - NA Duplicates NA ICP QC (ICS and Serial Dilution P LCS
  - NA Furnace AA P Mercury Analysis NA Cyanide Analysis
- P Percent Solids Calculations - Solids Only
- P Sample Prep/Digestion Logs (Form XIII)
- P Analysis Run Log (Form XIV)
- P Chain-of-Custody
- P Sample Description
- P Case Narrative
- P Method References

KEY:

P = Provided in original data package, as required
R = Provided as resubmission
NP = Not provided in original data package or as resubmission
NR = Not required
NA = Not applicable to this data package or analysis

Comments:

I. DELIVERABLES

All required Deliverables were present.

Yes ✓ No ___

Comments: None

II. HOLDING TIMES

All CLP holding times were met.

Yes ___ No ___ N/A ✓

Comments: None

All 40 CFR Part 136 technical holding times were met.

Yes ✓ No ___

Comments: 28-day holding time was met.

III. INSTRUMENT CALIBRATIONS: STANDARDS AND BLANKS

Initial instrument calibrations were performed according to requirements.

Yes ✓ No ___

Comments: The initial calibration correlation coefficient was greater than 0.995.

The instruments were calibrated daily and each time an analysis run was performed.

Yes ✓ No ___

Comments: None

The instruments were calibrated using one blank and the appropriate number of standards.

Yes ✓ No ___

Comments: A blank and five initial calibration standards were analyzed.

IV. FORM 1 - SAMPLE ANALYSIS RESULTS

Sample analyses were entered correctly on Form Is.

Yes ✓ No ___

Comments: None

V. FORM 2A - INITIAL AND CONTINUING CALIBRATION VERIFICATION

The initial and continuing calibration verification standards (ICV and CCV, respectively) met requirements.

Yes ✓ No ___

Comments: An ICV was analyzed immediately after the initial calibration.

The calibration verification results were within 80-120% for recovery.

Yes ✓ No ___

Comments: None

The continuing calibration standards were run at 10% frequency.

Yes ✓ No ___

Comments: The CCV was analyzed at a frequency of 10% or every two hours as required.

VI. FORM 2B - CRDL STANDARD FOR ICP AND AA

ICP Analysis: Standards (CRI) at two times the CRDL or the IDL (whichever were greater) were analyzed at the beginning and the end of each sample run, or at a minimum of twice per eight hours, whichever was more frequent.

Yes ___ No ___ N/A ✓

Comments: None

GFAA Analysis: Standards (CRA) at two times CRDL were analyzed at the beginning of each sample run.

Yes ___ No ___ N/A ✓

Comments: None

The CRI and/or the CRA were analyzed after the ICV.

Yes ___ No ✓

Comments: No data are qualified due to the absence of CRI and/or CRA.

VII. FORM 3 - BLANKS

The initial and continuing calibration blanks (ICB and CCB, respectively) met SW846 requirements.

Yes ✓ No ___

Comments: None

The continuing calibration blanks were run at 10% frequency.

Yes ✓ No ___

Comments: None

A laboratory/preparation blank was run at the frequency of one per twenty samples, or per sample delivery group (whichever is more frequent), and for each matrix analyzed.

Yes ✓ No ___

Comments: None

All analyzed blanks were free of contamination.

Yes ✓ No ___

Comments: None

VIII. FORM 4 - ICP INTERFERENCE CHECK SAMPLE

The ICP interference check sample (ICS) was run twice per eight hour shift and/or at the beginning and end of each sample set analysis sequence (whichever is more frequent).

Yes ___ No ___ N/A ✓

Comments: None

Percent recovery of the analytes in solution ICSAB were within the range of 80-120%.

Yes ___ No ___ N/A ✓

Comments: None

IX. FORM 5A - MATRIX SPIKE SAMPLE ANALYSIS

A matrix spike sample was analyzed with every twenty or fewer samples of a similar matrix, or one per sample delivery group (whichever is more frequent).

Yes ___ No ___ N/A ✓

Comments: Wipe samples are entirely consumed during analysis, therefore no matrix spike was analyzed.

The percent recoveries (%R) were calculated correctly.

$$\%\ Recovery = \frac{(SSR - SR)}{SA} \times 100$$

SSR = spiked sample result
SR = sample result
SA = spike added

Yes ___ No ___ N/A ✓

Comments: None

Spike recoveries were within the range of 75-125% (an exception is granted where the sample concentration is four times the spike concentration.

Yes ___ No ___ N/A ✓

Comments: None

X. FORM 5B - POST DIGEST SPIKE RECOVERY

A post-digest spike was performed for those elements that did not meet the specified criteria (i.e., Pre-digestion/pre-distillation spike recovery falls outside of control limits and sample result is less than four times the spike amount added, exception: Ag, Hg).

Yes ___ No ___ Not Required ✓

Comments: None

XI. FORM 6 - DUPLICATE SAMPLE ANALYSIS

Duplicate sample analysis was performed with every twenty or fewer samples of a similar matrix, or one per sample delivery group (whichever is more frequent).

Yes ___ No ___ N/A ✓

Comments: Wipe samples are entirely consumed during analysis, therefore no sample duplicate was analyzed.

The RPDs were calculated correctly.

$$RPD = \frac{(S - D)}{(S + D)/2} \times 100$$

S = sample
D = duplicate

Yes ___ No ___ N/A ✓

Comments: None

For sample concentrations greater than five times the CRDL, RPDs were within ±20% (limits of ±35% apply for soil/sediments/tailings samples).

Yes ___ No ___ N/A ✓

Comments: None

For sample concentrations less than five times the CRDL, duplicate analysis results were within the control window of ± CRDL (two times CRDL for soils).

Yes ___ No ___ N/A ✓

Comments: None

XII. GFAA QC

Not required.

XIII. FORM 7 - LABORATORY CONTROL SAMPLE

The laboratory control sample (LCS) was prepared and analyzed with every twenty or fewer samples of a similar matrix, or one per sample delivery group (whichever is more frequent).

Yes ✓ No ___

Comments: None

All results were within control limits.

Yes ✓ No ___

Comments: The LCS was recovered within control limits, indicating that the laboratory digestion and spiking process was acceptable.

XIV. FORM 8 - STANDARD ADDITION RESULTS

Results from graphite furnace standard additions were entered on Form VIII as directed.

Yes ___ No ___ N/A ✓

Comments: None

XV. FORM 9 - ICP QC

A serial dilution was performed for ICP analysis with every twenty or fewer samples of a similar matrix, or one per sample delivery group, whichever is more frequent.

Yes ___ No ___ N/A ✓

Comments: None

The serial dilution was without interference problems as defined.

Yes ___ No ___ N/A ✓

Comments: None

XVI. FORM 10 - QUARTERLY INSTRUMENT DETECTION LIMITS (IDL)

IDLs were provided for mercury.

Yes ✓ No ___

Comments: None

Reported IDLs met requirements.

Yes ✓ No ___

Comments: None

XVII. FORM 11 - INTERELEMENT CORRECTION FACTORS FOR ICP

Interelement corrections for ICP were reported.

Yes ___ No ___ N/A ✓

Comments: None

XVIII. FORM 12 - ICP LINEAR RANGES

ICP linear ranges were reported.

Yes ___ No ___ N/A ✓

Comments: None

XIX. LINEAR RANGE VERIFICATION ANALYSIS

Linear Range Verification Analysis (LRA) was performed and results were within control limits of ± 5% of the true value.

Yes ✓ No ___

Comments: None

XX. FORM 13 - PREPARATION LOG

Information on the preparation of samples for analysis was reported on Form XIII.

Yes ✓ No ___

Comments: None

XXI. FORM 14 - ANALYSIS RUN LOG

A Form XIV with the required information was filled out for each analysis run in the data package.

Yes ✓ No ___

Comments: None

XXII. Additional Comments or Problems/Resolutions not addressed above.

None

INORGANIC DATA QUALITY ASSURANCE REVIEW

Region VIII

DATA QUALIFIER DEFINITIONS

For the purpose of Data Validation, the following code letters and associated definitions are provided for use by the data validator to summarize the data quality. Use of additional qualifiers should be carefully considered. Definitions for all qualifiers used should be provided with each report.

GENERAL QUALIFIERS for use with both INORGANIC and ORGANIC DATA

R - Reported value is "rejected." Resampling or reanalysis may be necessary to verify the presence or absence of the compound.

J - The associated numerical value is an estimated quantity because the Quality Control criteria were not met.

U J - The reported amount is estimated because Quality Control criteria were not met. Element or compound was not detected.

N J - The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.

N - The analysis indicates the presence of an analyte for which there is presumptive evidence to make a tentative identification.

ACRONYMS

AA	Atomic Absorption
Ag	Silver
CCB	Continuing Calibration Blank
CCV	Continuing Calibration Verification
CFR	Code of Federal Regulations
CLP	Contract Laboratory Program
CRA	CRDL standard required for AA
CRDL	Contract Required Detection Limit
CRI	CRDL standard required for ICP
CV	Cold Vapor
EPA	U.S. Environmental Protection Agency
GFAA	Graphite Furnace Atomic Absorption
Hg	Mercury
ICB	Initial Calibration Blank
ICP	Inductively Coupled Plasma
ICS	Interference Check Sample
ICSA	Interference Check Sample (Solution A)
ICSAB	Interference Check Sample (Solution AB)
ICV	Initial Calibration Verification
IDL	Instrument Detection Limit
LCS	Laboratory Control Sample
LRA	Linear Range Verification Analysis
MSA	Method of Standard Additions
PDS	Post Digestion Spike
QC	Quality Control
RPD	Relative Percent Difference
RPM	Regional Project Manager
RSD	Percent Relative Standard Deviation
SA	Spike Added
SAS	Special Analytical Services
SDG	Sample Delivery Group
SR	Sample Result
SSR	Spiked Sample Result
TPO	Technical Project Officer

U.S. EPA - CLP

EPA SAMPLE NO.

1

INORGANIC ANALYSIS DATA SHEET

WI0001

Lab Name: ENVIRON. SCI. & ENGINEER. Contract: 1795122G

Lab Code: ESECO Case No.: SAS No.: SDG No.: D17560

Matrix (soil/water): SOIL Lab Sample ID: 220208*5

Level (low/med): LOW Date Received: 05/06/96

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): ~~MG/KG~~ ug/Wipe 8/20/96

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				
7440-36-0	Antimony				
7440-38-2	Arsenic				
7440-39-3	Barium				
7440-41-7	Beryllium				
7440-43-9	Cadmium				
7440-70-2	Calcium				
7440-47-3	Chromium				
7440-48-4	Cobalt				
7440-50-8	Copper				
7439-89-6	Iron				
7439-92-1	Lead				
7439-95-4	Magnesium				
7439-96-5	Manganese				
7439-97-6	Mercury	7.4			CV
7440-02-0	Nickel				
7440-09-7	Potassium				
7782-49-2	Selenium				
7440-22-4	Silver				
7440-23-5	Sodium				
7440-28-0	Thallium				
7440-62-2	Vanadium				
7440-66-6	Zinc				
	Cyanide				

LR 8/20/96

Color Before: WHITE Clarity Before: NA Texture: NA

Color After: WHITE Clarity After: NA Artifacts: NA

Comments:

SAMPLE WAS A WIPE WHICH HAD TO BE DILUTED 1/50 TO BRING IT WITHIN THE LINEAR RANGE OF THE INSTRUMENT. THE UNITS ARE UG PER WIPE.